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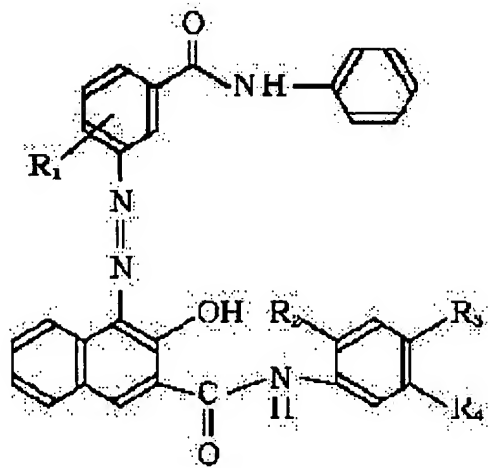
## (54) MAGENTA TONER

## (57)Abstract:

PROBLEM TO BE SOLVED: To obtain a toner which shows good hue and excellent color reproducibility, which suppresses decrease in triboelectric charges of the toner in a high temp. and high humidity environment, which suppresses extra triboelectric charges in a low temp. and low humidity environment and which has excellent environmental stability, and to form an image having excellent light resistance by using a specified polyester resin as a binder resin and using a specified magenta coloring agent.

SOLUTION: The binder resin used is a polyester resin having 2 to 25 mgKOH/g acid value, and the magenta coloring agent is a compd. expressed by the formula.

Titanium oxide fine powder or aluminum oxide fine powder having 0.01 to 2  $\mu\text{m}$  average primary particle diameter and subjected to hydrophobic treatment is externally added to the magenta color toner particles. The magenta toner has 3 to 15  $\mu\text{m}$  weight average particle size. In the formula, each R1 to R4 is one of OCH3, halogen group, H or the like. The compd. expressed by the formula is preferably compounded by 1 to 15 pts.wt. to 100 pts.wt. of the binder resin in the toner.



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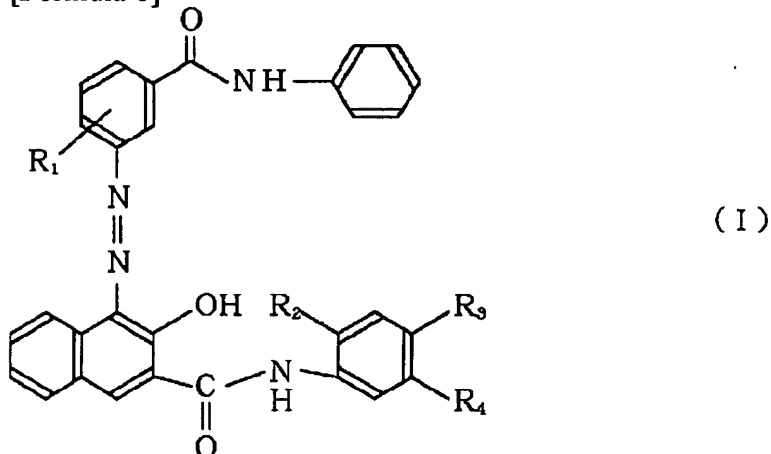
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## CLAIMS

[Claim(s)]

[Claim 1] In the Magenta toner which has the Magenta color toner particle which contains a binding resin and a Magenta coloring agent at least, this binding resin is polyester resin whose acid number is 2 - 25 mgKOH/g, and this Magenta coloring agent is the following formula (I).

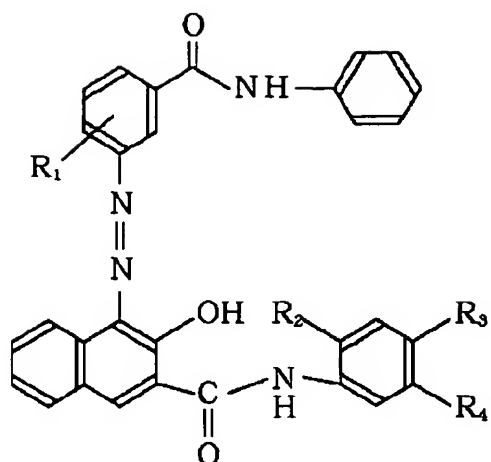
[Formula 1]



(R1, R2, R3, and R4 show NH2, N (CH3)2, or NHCOCH3 [ OCH3, a halogen machine, H, OH and NO2, OC2H5, an alkyl group, and ] among a formula.) This Magenta toner is a Magenta toner with which it is characterized by for the titanium oxide pulverized coal or aluminum-oxide pulverized coal of 0.01-2 micrometers of first [ an average of ] particle diameters by which hydrophobing processing was carried out being \*\* (ed) outside by this Magenta color toner particle, and weighted-mean particle size being 3-15 micrometers.

[Claim 2] This Magenta coloring agent is the following formula (II).

[Formula 2]

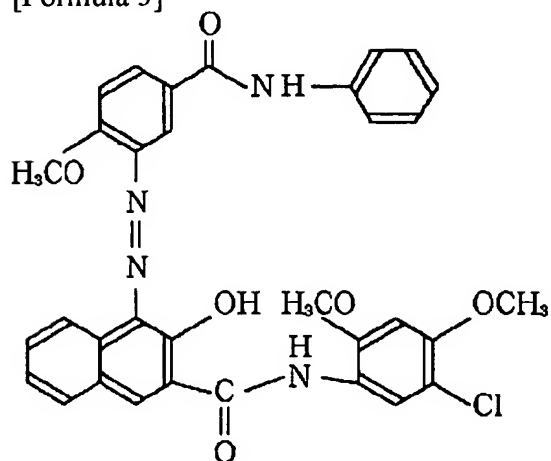


(II)

(-- R<sub>1</sub>, R<sub>2</sub>=OCH<sub>3</sub>, R<sub>3</sub>, R<sub>4</sub>=OCH<sub>3</sub>, or Cl is shown among a formula Magenta toner according to claim 1 which is the compound shown by).

[Claim 3] This Magenta coloring agent is the following formula (III).

[Formula 3]

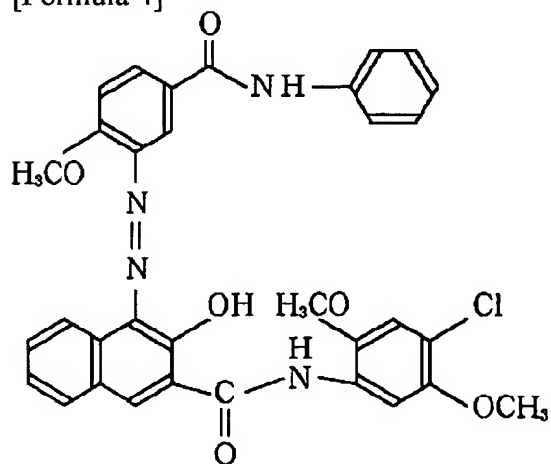


(III)

The Magenta toner according to claim 1 which is the compound come out of and shown.

[Claim 4] This Magenta coloring agent is the following formula (IV).

[Formula 4]



(IV)

The Magenta toner according to claim 1 which is the compound come out of and shown.

[Claim 5] This titanium oxide pulverized coal by which hydrophobing processing was carried out, or an

aluminum-oxide pulverized coal is a Magenta toner according to claim 1 to 4 characterized by the first [ an average of ] particle diameter being 0.01-0.2 micrometers.

[Claim 6] The Magenta toner according to claim 1 to 5 characterized by carrying out 1-15 weight section content of this Magenta coloring agent shown by the formula (I) to this binding resin 100 weight section.

[Claim 7] This Magenta toner is a Magenta toner according to claim 1 to 6 characterized by having negative electrification nature.

[Claim 8] This Magenta toner is a Magenta toner according to claim 1 to 7 characterized by containing the metallic compounds of an aromatic carboxylic-acid derivative further.

[Claim 9] The metallic compounds of this aromatic carboxylic-acid derivative are Magenta toners according to claim 8 which are colorlessness, white, or light color.

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[Translation done.]

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the Magenta toner applied to electrophotography, electrostatic recording, electrostatic printing, toner jet method record, etc.

[0002]

[Description of the Prior Art] Image KOMYUNYUKESHON which also depends a communication-of-information mechanism with an image in full color from the visual world is permeating broadly with low-pricing of the computer device for the personal user of these days. Under such needs, also in the image formation equipment like a printer or a copying machine which is one of the output meanses, full color-ization is progressing quickly centering on the low-grade machine commercial scene, and a color picture is becoming more familiar also in a general user.

[0003] Although there are generally many methods, such as a hot printing method, an ink ribbon method, and an ink-jet method, as such output equipment depended in full color, what is depended on an electrophotography method as the whole has the large majority. Generally, after an electrophotography method uses the photoconductivity matter, forms an electric latent image on a photo conductor by various meanses, subsequently develops this latent image using a toner and imprints a toner picture to the imprint material like paper if needed, it is established with heating, pressurization, heating pressurization, or a solvent steam, and obtains a color picture.

[0004] When full color, a color is reproduced using the toner of four colors which added the black toner to the chromatic color toner of three colors of the yellow toner which is the three primary colors of color material, a Magenta toner, and a cyano toner, or it. For example, an electrostatic latent image is formed on a photoconduction layer through the color-separation light passage filter which has the relation of the color and the complementary color of a toner in the light from a manuscript. Subsequently, a color toner is held through a development process and an imprint process at a base material. Subsequently, a color toner piles up the above-mentioned process on the same base material, doubling a multiple-times deed and registration one by one, and the last full color picture is acquired by fixing.

[0005] In recent years, in a full color picture, the demand to high-definition-izing and highly-minute-izing is increasing increasingly. For the general user who looked at printing and got used, the full color copy picture desires not still more satisfying level but the level which approached printing more, and level which approached the photograph more. That is, realization of the homogeneity of the solid picture in the latus picture area in a copy picture, the homogeneity of a halftone picture, and the latus dynamic range from high concentration to low concentration is desired, and development of the toner excellent in the toner which enables a high picture concentration output, the toner of about the same color tone as printing, the toner excellent in OHP transparency (light-transmission nature), and lightfastness serves as pressing need.

[0006] Therefore, the actual condition is that a coloring agent which whose tinting strength was naturally high also as a coloring agent used for a toner, and was excellent in the clear nature and transparency of a color, was excellent also in lightfastness, in addition was excellent also in the

dispersibility in a resin is desired strongly.

[0007] On the other hand, a color copying machine is connected with a computer through a controller, and the color management system which carries out the color management of the whole system has come to be proposed as the case used as a high-definition color printer increases. In the user of the result specification, it comes to desire strongly to be in agreement in respect of the output picture of printing to which the output picture outputted with the color copying machine of an electrophotography method used process ink as the base, and a tint, and a thing called the toner which has the same color tone as process ink has also come to be required.

[0008] So far, although it crawls as a pigment for Magenta toners and is proposed in shoes, the pigment of a Quinacridone system has been widely used in that excel in the clear nature and transparency of a color, and it excels also in lightfastness.

[0009] JP,49-27228,A, JP,57-54954,A, JP,1-142559,A, etc. are indicating the toner which contained 2 and 9-dimethyl Quinacridone independently. Although this toner was excellent in lightfastness to be sure, it was hard to be called Magenta toner skillful enough.

[0010] JP,64-9466,A combines the pigment which lake-ized the Quinacridone system pigment, the xanthene system color, or the xanthene system color, and is indicating what it was going to raise the vividness of a toner for. Still sufficient vividness was not obtained, the color changed and this toner had the trouble of discoloring if a picture is left for a long time.

[0011] JP,1-154161,A tends to raise the transparency of a Magenta toner and is indicating that a mean particle diameter uses a Quinacridone system pigment 0.5 micrometers or less. The transparency of a toner was looked to that extent like [ the distributed method to a pigment, a resin, and a resin ], therefore is not decided, and the high Magenta toner of transparency was not necessarily obtained.

[0012] On the other hand, in order to acquire the picture of the color tone which carries out the color reproduction of the case of a full color picture with the toner of four colors which added the black toner to the chromatic color toner of three colors of the yellow toner which is the three primary colors of color material, a Magenta toner, and a cyano toner, or it, and is made into the purpose, the attempt in which balance with other colors is important and will change the color tone of a Magenta toner a little is also made.

[0013] For example, JP,63-18628,B is indicating the mixture of the compound containing two sorts of replaced Quinacridones, and it has indicated that the mixed crystal of 2 and 9-dimethyl Quinacridone and a non-replaced Quinacridone is used for JP,62-291669,A as a coloring agent for Magentas, and has the target hue, and is proposed as a coloring agent aiming also at the improvement of the triboelectrification nature of a toner.

[0014] However, although the tint was shifted in the direction of redness as a whole rather than the time of using 2 and 9-dimethyl Quinacridone independently, as compared with the hue of the Magenta ink for offset printing, blueness was strong and many points which should be improved were left behind.

[0015] On the other hand, many examination aiming at the improvement in dispersibility of the coloring agent which exists in a toner is also made.

[0016] Although the method of JP,61-117565,A and JP,61-156054,A dissolving beforehand a binding resin, a coloring agent, an electric charge control agent, etc. in a solvent, removing this solvent, and obtaining a toner is indicated, these have the trouble like that control of the dispersibility of an electric charge control agent is difficult, and remaining in the toner whose solvent is a final product, and giving the odor which is not desirable.

[0017] Although JP,61-91666,A is indicating the toner manufacture method of having used the halogen system solvent, since this manufacture method has polarity with a strong halogen system solvent, it has the fault that the coloring agent used is restricted.

[0018] Although the method of manufacturing a toner is indicated while JP,4-39671,A, JP,4-39672,A, and JP,4-242752,A apply heating and pressurization in a kneader, and this method is desirable to distribution of a coloring agent indeed, the chain of the binding resin which constitutes a toner will be cut by the powerful kneading load, and the partial low-molecular quantification in a macromolecule will be promoted. Therefore, it becomes easy to generate elevated-temperature offset at a fixing process.

Since the toner of three colors or four colors is especially established in a full color copy in that by which the laminating was carried out in layers, the latitude of elevated-temperature-proof offset is farther [ than the case of monochrome toner ] severe, and becomes the cause by which slight molecule cutting in a macromolecule produces elevated-temperature offset easily.

[0019] Although JP,5-34978,A taught the resin and the aqueous filter press cake of a pigment to the kneading machine, heating kneading was carried out, the distribution to the resin of a pigment is attained, and this method is desirable to distribution of a pigment indeed, the pigment in consideration of the tint and color-reproduction nature of a toner is not described at all.

[0020] Moreover, when using the binary system developer with which a developer generally consists of a toner and a carrier, by friction with a carrier, you make it a toner charged in the necessary amount of electrifications, and electrification polarity, and an electrostatic-charge image is developed using an electrostatic attraction. Therefore, in order to obtain a good visible image, it is required for the triboelectrification nature of a toner to be mainly good.

[0021] Many researches are made that the triboelectrification nature which was excellent in the material which constitutes the developer like examination of search of carrier core material and carrier coat material, optimization of the amount of coats or the charge control agent added to a toner, and a fluid grant agent and improvement of the binder which serves as a parent further should be attained to the problems above today.

[0022] By the technical field concerned, the attempt in which particle size of a color toner will be made fine and high-definition colorization will be attained is made to meet highly minute [ of a copying machine or a printer ], and the demand of high-definition-izing in recent years. If the particle size of a toner becomes fine, the surface area per unit weight will increase, and it is in the inclination for the amount of electrifications of a toner to become large, and becomes easy to generate picture \*\*\*\*\* and durable degradation. In addition, since the amount of electrifications of a toner is large, the adhesion force of toner particles is strong, a fluidity falls, and it is easy to produce a problem in the TORIBO grant to the stability and the supply toner of toner supply.

[0023] Furthermore, since neither the magnetic substance nor the conductive black matter like carbon black is included, the case of a color toner is in the inclination for there to be no portion which leaks electrification and for the amount of electrifications to become large generally. This inclination is more remarkable when a polyester system binder especially with a negative high electrification performance is used.

[0024] Especially in the color toner, a property as shown below is desired strongly.

(1) The state and bird clapper almost near perfect melting to the extent that the form of a toner particle cannot be distinguished are important for the fixed color toner so that it may reflect irregularly to light and a color reproduction may not be barred.

(2) It is important that it is the color toner which has the transparency which does not bar the toner layer of a different color tone under the toner layer.

(3) It is important for each color toner to constitute to have the hue and the part light reflex property of maintaining balance, and sufficient saturation.

[0025] The examination about many binding resins is made from such a viewpoint, and it looks forward to the color toner with which are satisfied of the above-mentioned property. although many polyester system resins are used as a binding resin for color toners in the technical field concerned today, generally the color toner which has a polyester system resin tends to be influenced of temperature and humidity, problems, such as the excess[ under damp ] amount of electrifications and a shortage of the amount of electrifications under highly humid, tend to arise, and it looks forward to development of the color toner which has the amount of electrifications stabilized also in extensive environment

[0026]

[Problem(s) to be Solved by the Invention] The purpose of this invention is to offer the Magenta toner which solved the trouble like \*\*\*\*.

[0027] That is, the purpose of this invention has the high tinting strength which covers the latus dynamic range from (1) low concentration to high concentration, (2) saturation and its lightness are high, it is

excellent in (3) OHP transparency, is excellent in the dispersibility of (4) coloring agents, has (5) high lightfastness, and is to offer the Magenta toner whose Magenta of process ink (6) color tones suit. [0028] It is always stabilized. further -- the purpose of this invention -- (7) -- good fixing nature and color mixture nature being shown, and that environment, such as (8) temperature and humidity, is hard to be influenced And the glossiness which has sufficient triboelectrification nature and raises (9) picture quality is high. (10) Elevated-temperature offset is fully prevented and the temperature which can be established is large. Inside of (11) development counters, That is, there is no toner weld with parts, such as a sleeve, a blade, and an application roller, and (12) cleaning nature is good and is to offer the Magenta toner which does not carry out filming to a photo conductor.

[0029] Furthermore, the purpose of this invention is to offer the Magenta toner which does not have (13) fogging, was excellent in (14) highlight repeatability, was excellent in (15) solid homogeneity, and was excellent in (16) durable stability.

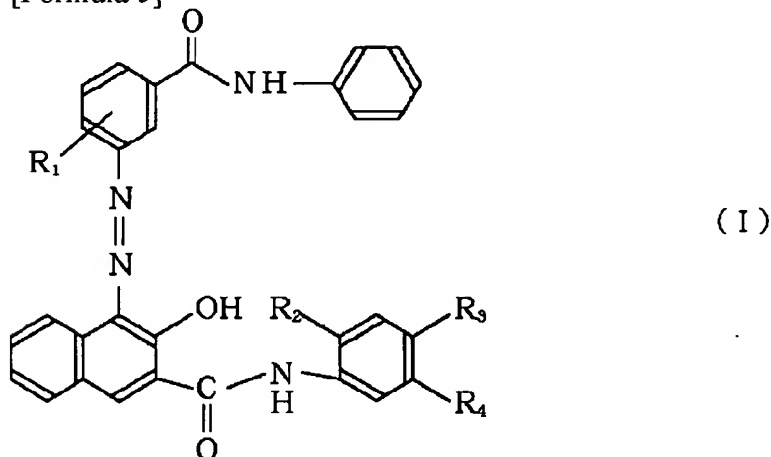
[0030] The further purpose of this invention is to offer the Magenta toner which was excellent in the fluidity and was excellent in development fidelity and imprint nature.

[0031]

[Means for Solving the Problem] In the Magenta toner which has the Magenta color toner particle to which this invention contains a binding resin and a Magenta coloring agent at least, this binding resin is polyester resin whose acid number is 2 - 25 mgKOH/g, and this Magenta coloring agent is the following formula (I).

[0032]

[Formula 5]



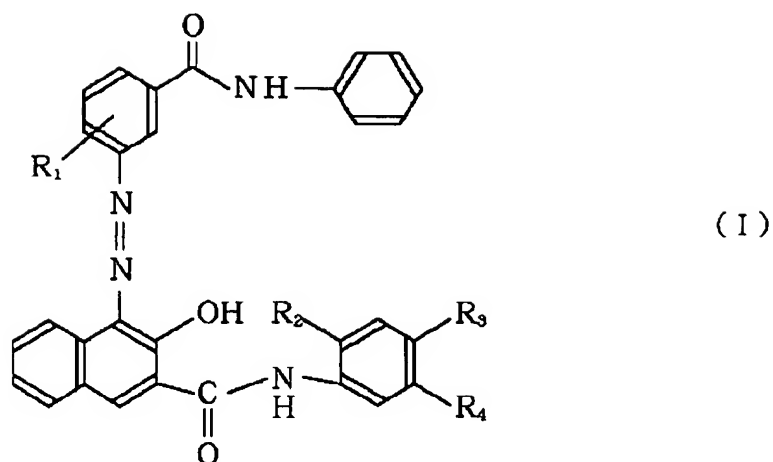
(R1, R2, R3, and R4 show NH2, N (CH3)2, or NHCOCH3 [ OCH3, a halogen machine, H, OH and NO2, OC2H5, an alkyl group, and ] among a formula.) The titanium oxide pulverized coal or aluminum-oxide pulverized coal of 0.01-2 micrometers of first [ an average of ] particle diameters by which hydrophobing processing was carried out is \*(ed) outside by this Magenta color toner particle, and this Magenta toner is related with the Magenta toner characterized by weighted-mean particle size being 3-15 micrometers.

[0033]

[Embodiments of the Invention] This invention persons are the following formulas (I) as a Magenta coloring agent, when the Magenta coloring agent applicable to a Magenta toner was examined wholeheartedly.

[0034]

[Formula 6]

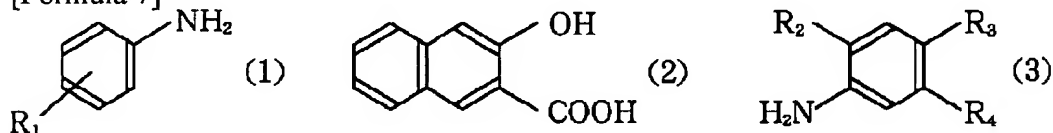


(R1, R2, R3, and R4 show NH<sub>2</sub>, N (CH<sub>3</sub>)<sub>2</sub>, or NHCOCH<sub>3</sub> [ OCH<sub>3</sub>, a halogen machine, H, OH and NO<sub>2</sub>, OC<sub>2</sub>H<sub>5</sub>, an alkyl group, and ] among a formula.) The Magenta toner of the good hue made into the purpose by using ("compound (I)" is called hereafter) is obtained. And when the above-mentioned compound (I) has an effect remarkable in electrification stabilization of a color toner, especially polyester resin is used as a binding resin, the effect finds out a very remarkable thing. It explains in detail below.

[0035] The compound (I) used by this invention can be compounded from the beta-naphthol derivative shown by the following formula (1), (2), or (3). Moreover, it is not limited to this method at all.

[0036]

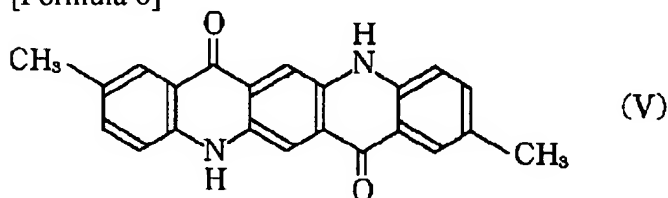
[Formula 7]



[0037] The compound (I) used by this invention is the chromatic color pigment excellent in weatherability, its dispersibility to a binding resin is good, and the Magenta toner of a skillful hue can be prepared.

[0038] On the other hand, it is [0039].

[Formula 8]



When 2 and 9-dimethyl Quinacridone (it is described as a compound (V) below.) shown with the above-mentioned structure expression shows a vivid Magenta color and this is used as a coloring agent for toners, a toner with high tinting strength is obtained. However, when it compares with the hue of the Magenta of process ink, it has the feature that blueness is strong.

[0040] Moreover, as a Magenta pigment for process ink, the pigment of a carmine system is used widely until now, and some examples which applied this to the toner are also reported. merely, the pigment of a carmine system is lacking in lightfastness, and clear-comes out of the difference as compared with the pigment of a Quinacridone system

[0041] They are excellent in lightfastness, lightness and saturation are high, and this invention persons are the latus Magenta toners of color-reproduction nature, and as a result of examining wholeheartedly the hue of the Magenta of process ink, and the Magenta toner which existed, when a compound (I) is

used, they find out that the above-mentioned purpose can be attained.

[0042] For example by the blend with the red pigment of a carmine system, and 2 and 9-dimethyl Quinacridone, this cannot be attained at all, when [ which desires high lightness and high saturation more ] generally used conventionally.

[0043] Moreover, it excels also in lightfastness, and is the weather meter of marketing of a picture sample, and the toner of this invention is JIS. Change of color was not seen when [ most ] a long-term exposure test was performed almost according to K7102.

[0044]  $\Delta E$  of a lower formula estimated the degree of change of color quantitatively.

[0045]

[Equation 1]

$$\Delta E = \left\{ (L_1^* - L_2^*)^2 + (a_1^* - a_2^*)^2 + (b_1^* - b_2^*)^2 \right\}^{1/2}$$

$L_1^*$   $a_1^*$   $b_1^*$  暴露前の色彩のデータ

$L_2^*$   $a_2^*$   $b_2^*$  暴露後の色彩のデータ

( $\Delta E$ はその値が小さいほど光による耐色が少ないことを示す)

[0046] The Magenta toner which contains the compound (I) as a Magenta coloring agent (pigment) shows the hue shifted to redness, and has the spectral characteristic desirable as a Magenta toner for full color image formation. Furthermore, lightness and the saturation of the Magenta toner containing the compound (I) are also high. Although the repeatability of a body warmth color is important in a full color picture, if the Magenta toner containing a compound (I) is used, even if a body warmth color can also be reappeared good and it will project further the color picture currently formed in the OHP sheet with the over head projector (OHP), it excels in transparency. Moreover, the Magenta toner containing the compound (I) has stable picture concentration at the time of several multi-sheet durability, and a clear picture without fogging is acquired over a long period of time.

[0047] the toner of this invention -- setting -- a compound (I) -- the binding resin 100 weight section -- receiving -- 1 - 15 weight section -- it is preferably desirable 3 - 12 weight section and to carry out 4-10 weight section content more preferably When fewer than 1 weight section, the tinting strength of a toner declines, and however it may improve the dispersibility of a pigment, now, the high-definition picture of high picture concentration is hard to be acquired. On the other hand, when [ than 15 weight sections ] more, the transparency of a toner will fall and TORAPEN transparency will fall. In addition, the repeatability of neutral colors which are represented by human being's flesh color will also fall. Furthermore, the electrification nature of a toner also becomes unstable and problems, such as fogging under low-humidity/temperature environment and toner scattering under a high-humidity/temperature environment, are also caused.

[0048] In this invention, it is desirable as a binding resin to use polyester resin. Polyester resin is because it excels in fixing nature and is suitable for the color toner.

[0049] However, although electrification tends to become [ negative electrification ability ] strong excessively, when polyester resin uses a compound (I), the evil improves and the outstanding Magenta toner is obtained.

[0050] That is, the toner using the compound (I) demonstrates an effect to the amount fall suppression of electrifications under a high-humidity/temperature environment at the overamount prevention of electrifications under low-humidity/temperature environment, and a row.

[0051] although the reason is not certain -- a part of carboxyl group of a polyester end, hydroxyl, and the hydroxyl group in (Compound I) molecule and a carbonyl group -- hydrogen bond or a static -- the compatibility of a binding resin and a pigment increases for a \*\*\*\* combination, the dispersibility of a coloring agent improves as the result, and it is thought that electrification is stable

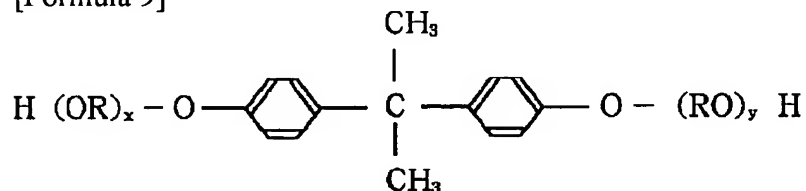
[0052] Moreover, it is expected that the good pigment dispersibility shown previously, therefore the

pigment blocked adsorption of the water to the functional group of a binding resin end, and the high amount of electrifications was so obtained under the high-humidity/temperature environment, and the amount fall suppression of electrifications under high-humidity/temperature is stable.

[0053] So, when polyester resin is used as a binding resin, in long-term durability, the high-definition picture of the stable picture concentration without fogging is acquired.

[0054] Especially, it is the following formula [0055].

[Formula 9]



(-- for the inside R of a formula, it is ethylene or a propylene machine, and x and y are one or more integers, respectively, and the averages of x+y are 2-10 Since the polyester resin which \*\*\*\*\* (ed) the carboxylic-acid components (for example, a fumaric acid, a maleic acid, a maleic anhydride, a phthalic acid, a terephthalic acid, trimellitic acid, pyromellitic acid, etc.) which use as a diol component the bisphenol derivative or substitution product represented with), and consist of the carboxylic acid, its acid anhydride, or its low-grade alkyl ester more than

[0056] When especially the acid number of polyester resin is 2 - 25 mgKOH/g, the electrification stability which was excellent in each environment is acquired.

[0057] That is, when the acid number is smaller than 2 mgKOH/g, a toner shows a charge-up inclination and tends to start picture \*\*\*\*\* under low-humidity/temperature environment.

[0058] On the other hand, when the acid number is larger than 25 mgKOH/g, it is lacking in the stability of electrification with the passage of time, and the inclination for the amount of electrifications to fall with durability is shown, and it becomes easy to produce especially picture defects, such as toner scattering and fogging, under a high-humidity/temperature environment.

[0059] the polyester resin used for this invention -- number average molecular weight (Mn) -- desirable - 1,500-50,000 -- more preferably, it is 10,000-90,000 more preferably and 6,000-100,000, and that Mw/Mn is 2-8 preferably have 2,000-20,000, and preferably good weight average molecular weight (Mw) The polyester resin which has satisfied the above-mentioned conditions has good heat fixing nature, its dispersibility of a coloring agent improves, its change of the amount of electrifications of a toner decreases, and its reliability of picture quality improves.

[0060] When the number average molecular weight (Mn) of polyester resin is less than 1,500, or when weight average molecular weight (Mw) is less than 6,000, in the durability of a certain thing, offset becomes easy to generate the vividness of sensibility which all looked at the smooth nature of a fixing picture front face highly, and preservation-proof stability falls, and we are anxious also about the new problem of generating of toner SUPENTO in which a toner component adheres to toner weld within a development counter, and a carrier front face. Furthermore, SHIEA cannot start easily at the time of melting kneading of the toner raw material at the time of manufacture of a Magenta color toner particle, the dispersibility of a Magenta coloring agent tends to fall, and, therefore, it is easy to produce change of the amount of electrifications of a toner.

[0061] Though fixing setting temperature must be made high and each is able to control the grade of distribution of a coloring agent although excelled in offset-proof nature when the number average molecular weight (Mn) of polyester resin exceeds 50,000, or when weight average molecular weight (Mw) exceeds 100,000, the surface smooth nature in the picture section falls, and it becomes easy for color-reproduction nature to fall.

[0062] When Mw/Mn of polyester resin is less than two, it becomes easy to produce the fall of the offset phenomenon by durability, and preservation-proof stability, toner weld within a development counter, and toner SUPENTO of a carrier like the case where the molecular weight of the above-mentioned [ bird

clapper ] with the small molecular weight itself is small, and dispersion in the amount of electrifications of a toner tends [ further ] to produce the polyester resin generally obtained.

[0063] Though fixing setting temperature must be made high and the grade of distribution of a coloring agent is able to be controlled although excelled in offset-proof nature when Mw/Mn of polyester resin exceeds 8, the surface smooth nature in the picture section falls, and it becomes easy for color-reproduction nature to fall.

[0064] The Magenta toner of this invention may contain an electric charge control agent further if needed. As an electric charge control agent, the metallic compounds of an aromatic carboxylic-acid derivative are mentioned. Preferably, a salicylic-acid metal salt, a salicylic-acid metal complex, an alkyl salicylic-acid metal salt, an alkyl salicylic-acid metal complex, a dialkyl salicylic-acid metal salt, and a dialkyl salicylic-acid metal complex are mentioned. As a metallic element, chromium, aluminum, and zinc are good.

[0065] When making these electric charge control agent contain in a Magenta color toner particle, although 4 - 8% of the weight of the range is preferably suitable, if it is the range which does not affect a color tone in a Magenta toner, as the content, it will not necessarily be restrained three to 10% of the weight.

[0066] When an electric charge control agent is used by the above-mentioned content, there is little initial change of the amount of electrifications, and it spoils [ the amount of absolute electrifications required at the time of development is easy to be obtained, and ] neither fogging nor picture quality called a picture concentration down as a result and is desirable.

[0067] In the Magenta toner of this invention, you may add the fatty-acid metal salt (for example, a zinc stearate, stearin acid aluminum) as lubricant, a fluorine content polymer impalpable powder (for example, impalpable powder of a polytetrafluoroethylene, poly vinylidene fluoride, and a tetrafluoroethylene-vinylidene fluoride copolymer) or the tin oxide, and the conductive grant agent like a zinc oxide if needed.

[0068] Furthermore, in this invention, a Magenta color toner particle may contain a release agent. For example, the oxide of an aliphatic hydrocarbon system wax and an aliphatic hydrocarbon system wax, an ester wax, the waxes that make fatty acid ester a principal component, saturation straight chain fatty acids, unsaturated fatty acid, saturated alcohol, polyhydric alcohol, fatty-acid amides, saturated fatty acid screw amides, unsaturated fatty acid amides, and aromatic system screw amides are mentioned.

[0069] as the content of the release agent in a Magenta color toner particle -- the binding resin 100 weight section -- receiving -- desirable -- 0.1 - 20 weight section -- 0.5 - 10 weight section is more preferably good When the content of a release agent exceeds 20 weight sections, a blocking resistance and elevated-temperature-proof offset nature tend to fall, and when fewer than the 0.1 weight sections, there are few mold release effects.

[0070] As for these release agents, it is desirable to contain to a binding resin by the method of dissolving a resin in a solvent and usually, raising resin solution temperature, and carrying out addition mixture, while agitating, and the method of mixing at the time of kneading.

[0071] How to grind mechanically, to classify coarse grinding and to obtain a toner after kneading a component well in manufacture of a Magenta color toner particle with the heat kneading machine like; hot calender roll, a kneader, and an extruder; after distributing the material like a coloring agent in a binding resin solution, method; obtained by carrying out spray drying is applicable.

[0072] In this invention, the weighted-mean particle size of a Magenta toner has 3-15-micrometer preferably good 4-12 micrometers. When the weighted-mean particle size of a Magenta toner is less than 3 micrometers, it is hard coming to attain electrification stabilization, and becomes easy to generate fogging and toner scattering in durability. When the weighted-mean particle size of a Magenta toner exceeds 15 micrometers, the repeatability of the halftone section will fall greatly and the acquired picture will turn into a GASA \*\*\*\*\* picture.

[0073] In the Magenta toner of this invention, it is good for a Magenta color toner particle as a flow improver to \*\* the titanium oxide pulverized coal or aluminum-oxide pulverized coal of 0.01-2 micrometers of first [ an average of ] particle diameters by which hydrophobing processing was carried

out outside.

[0074] In the flow improver as an external additive, it becomes an important factor it not only to raise the fluidity of a Magenta toner, but not to check the electrification nature of a Magenta toner.

[0075] Therefore, it becomes possible it to be good that hydrophobing processing of the front face is carried out, and, as for a titanium oxide pulverized coal or an aluminum-oxide pulverized coal, to satisfy simultaneously fluid grant by that cause and stabilization of electrification.

[0076] A titanium oxide pulverized coal or an aluminum-oxide pulverized coal excepts the influence of the moisture which is the factor which influences the amount of electrifications by carrying out hydrophobing processing, and it becomes possible to raise the environmental capability of a Magenta toner by reducing the gap of the bottom of highly humid, and the amount of electrifications under damp. Furthermore, it becomes possible to prevent condensation of a primary particle in hydrophobing down stream processing, and enables the external additive with little secondary condensation to perform uniform electrification grant with a Magenta toner.

[0077] Especially in this invention, the titanium oxide pulverized coal or alumina pulverized coal of a fluidity whose first [ an average of ] particle diameter is 0.01-2 micrometers is good, and since it becomes uniform charging a negative electric charge nature Magenta toner and it is hard coming to generate toner scattering and fogging as a result, it is desirable. Furthermore, it becomes that it is hard to be embedded on a Magenta color toner particle front face, and is hard to produce toner degradation, and several multi-sheet endurance improves. This inclination is more remarkable in the color toner of sharp melt nature.

[0078] When the first [ an average of ] particle diameter of a titanium oxide pulverized coal or an aluminum-oxide pulverized coal is less than 0.01 micrometers, a processing pulverized coal becomes a Magenta color toner particle front face is easy to be embedded, it is easy to produce toner degradation on it early, and endurance tends to fall to it. This inclination is more remarkable when it applies to the color toner of sharp melt nature.

[0079] Moreover, when exceeding 2 micrometers, a fluidity falls, electrification of a Magenta toner tends to become uneven, and it is easy to produce scattering of a toner, fogging, etc. as a result, and is hard coming to generate a high definition toner picture.

[0080] In the Magenta toner of this invention, the addition of a titanium oxide pulverized coal or an aluminum-oxide pulverized coal is desirable, and 1.0 - 2.5 % of the weight is still more preferably good 0.7 to 3.0% of the weight more preferably 0.5 to 5.0% of the weight. The fluidity of the Magenta toner with which are satisfied of the above-mentioned range is good, the stable amount of electrifications can be maintained, and it is hard to produce toner scattering.

[0081] When using the Magenta toner of this invention as a binary system developer, as a carrier used, the iron which is not oxidized [ scaling or ], nickel, copper, zinc, cobalt, manganese, chromium, the magnetic metals like rare earth, those magnetic alloys, those magnetic oxides, those magnetic ferrites, etc. can be used, for example.

[0082] In the case of the carrier with which the carrier covered the carrier core with covering material, each of methods of making dissolve or suspend the covering material like a resin, applying it into a solvent, as a method of covering with a resin by making the front face of a carrier core into covering material, and making it adhere to a carrier core and methods of only mixing by fine particles can apply.

[0083] As covering material of a carrier core, although it is appropriate independent or to use the metal complex of a polytetrafluoroethylene, a monochrome chlorotrifluoroethylene polymer, a polyvinylidene fluoride, silicone resin, polyester resin, and a di-tertiary-butyl salicylic acid, a styrene resin, an acrylic resin, a polyamide, a polyvinyl butyral, and an amino acrylate resin by plurality, it is not necessarily restrained by this, for example.

[0084] Although what is necessary is just to determine the throughput of the above-mentioned material suitably, generally its 0.1 - 30 % of the weight (preferably 0.5 - 20 % of the weight) is desirable in a total amount to a carrier.

[0085] As for the mean particle diameter of a carrier, it is preferably desirable to have 20-70 micrometers 10-100 micrometers.

[0086] The coat magnetism ferrite carrier which coats preferably the resin like silicone resin, a fluorine system resin, a styrene resin, an acrylic resin, and a methacrylate system resin for the front face of the magnetic core particle like a magnetic ferrite core particle 0.1 to 1% of the weight 0.01 to 5% of the weight, and has especially the above-mentioned mean particle diameter whose carrier particle of 250-mesh path 400-mesh-on is 70 % of the weight or more as a desirable carrier is mentioned.

[0087] It is in the Magenta toner of this invention better for taste, triboelectrification nature is obtained, and the above-mentioned coat magnetism ferrite carrier is effective in raising an electrophotography property further, when a particle size distribution is sharp.

[0088] When mixing with the Magenta toner in this invention and preparing a two component developer, if the mixed ratio is more preferably carried out to 4 % of the weight - 10% of the weight as toner concentration in a developer 3 % of the weight to 13% of the weight 2 % of the weight to 15% of the weight, a usually good result will be obtained. In the case where picture concentration is low at less than 2 % of the weight, and toner concentration exceeds \*\* and 15 % of the weight which becomes empty, it is easy to produce fogging and scattering inside the plane, and is in the inclination for the useful life longevity of a developer to become short.

[0089] Next, the Magenta toner of this invention is applied, and how to form a full color picture by the xerography is explained, referring to drawing 1.

[0090] Drawing 1 is the outline block diagram showing an example of the image formation equipment for forming a full color picture by the xerography. The image formation equipment of drawing 1 is used as a full color copying machine and a full color printer. In the case of a full color copying machine, as shown in drawing 1, it has the digital color picture reader section in the upper part, and has the digital color picture printer section in the lower part.

[0091] In the picture reader section, by carrying a manuscript 30 on manuscript base glass 31, and carrying out an exposure scan with the exposure lamp 32, the reflected light image from a manuscript 30 is condensed in the full color sensor 34 with a lens 33, and a color color-separation picture signal is acquired. a color color-separation picture signal should pass an amplifying circuit (not shown) -- it is processed in a video-processing unit (not shown), and is sent out to the digital image printer section

[0092] In the picture printer section, the photoconductor drum 1 which is an image support has the photosensitive layer which has for example, an organic photo conductor, and is supported free [ rotation ] in the direction of an arrow. Around the photoconductor drum 1, the pre-exposure lamp 11, the corona-electrical-charging machine 2, the laser exposure optical system 3, the potential sensor 12, four development counters 4Y, 4C, 4M, and 4B with which colors differ, the drum-lifting quantity of light detection means 13, imprint equipment 5, and the cleaning machine 6 are arranged.

[0093] In laser exposure optical system, the laser beam changed and changed into the lightwave signal of image scan exposure in the laser output section (not shown) is reflected by polygon mirror 3a, and the picture signal from the reader section is projected on the field of a photoconductor drum 1 through lens 3b and mirror 3c.

[0094] At the time of image formation, the printer section rotates a photoconductor drum 1 in the direction of an arrow, after discharging it with the pre-exposure lamp 11, it carries out minus electrification of the photoconductor drum 1 uniformly with the electrification vessel 2, it irradiates a light figure E for every decomposition color, and forms an electrostatic-charge image on a photoconductor drum 1.

[0095] Next, a predetermined development counter is operated, the electrostatic-charge image on a photoconductor drum 1 is developed, and the toner picture by the toner is formed on a photoconductor drum 1. Development counters 4Y, 4C, 4M, and 4B develop negatives by approaching a photoconductor drum 1 alternatively according to each decomposition color by operation of each eccentric cam 24Y, 24C, 24M, and 24B.

[0096] Imprint equipment has adsorption-zone electrical machinery 5c for carrying out electrostatic adsorption of imprint drum 5a, imprint electrification machine 5b, and the record material and this, adsorption roller 5g that counters and 5d of inside electrification machines, outside electrification machine 5e, and 5h of decomposition electrification machines. Imprint drum 5a is supported to revolve

possible [ a rotation drive ], and imprint sheet 5f which is the imprint material support which supports imprint material in the opening region of the peripheral surface is adjusted in one on the cylinder. The resin film like a polycarbonate film is used for imprint sheet 5f.

[0097] Imprint material is conveyed by imprint drum 5a through an imprint sheet conveyance system from Cassettes 7a, 7b, or 7c, and is supported on imprint drum 5a. The imprint material supported on imprint drum 5a is repeatedly conveyed in a photoconductor drum 1 and the imprint position which countered with rotation of imprint drum 5a, and the toner picture on a photoconductor drum 1 is imprinted by operation of imprint electrification machine 5b on imprint material in process in which it passes through an imprint position.

[0098] As shown in drawing 1 , a toner picture may be imprinted from a photo conductor to direct imprint material, and may imprint the toner picture on a photo conductor to a middle imprint object, and may imprint a toner picture from a middle imprint object to imprint material.

[0099] The above-mentioned image formation process is repeated about yellow (Y), a Magenta (M), cyanogen (C), and black (B), and the color picture which piled up the toner picture of four colors on the imprint material on the imprint drum 5 is obtained.

[0100] Thus, the imprint material by which the toner picture of four colors was imprinted By operation of separation presser-foot-stitch-tongue 8a, separation Oshiage \*\* koro 8b, and 5h of separator electrical machinery It dissociates from imprint drum 5a, and is sent to the heating pressurization fixing assembly 9, after fixation in the color mixture of a toner, coloring, and imprint material is performed and considering as a full color fixing picture by carrying out heating pressurization fixing there, paper is delivered to a tray 10, and formation of a full color picture is completed. On the other hand, after a photoconductor drum 1 cleans a surface remains toner with the cleaning vessel 6 and is removed, an image formation process is again presented with it. As a cleaning member, you may use a fur brush, nonwoven fabrics, or those combined use in addition to a blade.

[0101] To imprint drum 5a, the electrode roller 14 which countered through imprint sheet 5f, the fur brush 15, and the oil removal roller 16 and the backup brush 17 are installed, and cleaning is performed in order to remove the adhesion fine particles on imprint sheet 5f of imprint drum 5a, and the adhesion oil on imprint sheet 5f. Such cleaning is performed before image formation or to the back, and is performed at any time at the time of a jam, i.e., paper jam generating.

[0102] The gap between imprint sheet 5f and a photoconductor drum 1 is arbitrarily considered as the composition which can be set up by operating an eccentric cam 25 to desired timing, and operating 29 cam-follower 5i currently united with imprint drum 5a. For example, at the time of power supply OFF, the interval of a photoconductor drum 1 can be separated from imprint drum 5a during standby.

[0103] A full color picture is formed by the above-mentioned image formation equipment. In the above-mentioned image formation equipment, a monochromatic fixing picture or a monochromatic multicolor fixing picture can be formed with monochrome mode or multicolor mode.

[0104] Next, the measuring method of each physical properties is explained below.

[0105] As a measurement measuring device of the particle size distribution of a toner, Coulter-counter TA-II or a coal tar multi-sizer (coal tar company make) is used. The electrolytic solution prepares NaCl solution about 1% using the 1st class sodium chloride. For example, ISOTON R-II (made in coal tar scientific Japan) can be used. As a measuring method, as a dispersant, 0.1-5ml (preferably alkylbenzene sulfonates) of surfactants is added, and 2-20mg of measurement samples is further added into the 100-150ml of the aforementioned electrolysis solution. The electrolytic solution which suspended the sample performs distributed processing for about 1 - 3 minutes with an ultrasonic distribution vessel, and it computes the volume-integral cloth of a toner, and a number distribution by the aforementioned measuring device by measuring it for every volume of a toner particle, and number each channel, using 100-micrometer aperture as an aperture. And it asks for the weighted-mean particle size (D4) (let the median of each channel be the central value for every channel) of the toner of the weight criteria searched for from the volume-integral cloth of a toner particle.

[0106] As a channel, 13 2.00-2.52 micrometers; 2.52-3.17 micrometers; 3.17-4.00 micrometers; 4.00-5.04 micrometers; 5.04-6.35 micrometers; 6.35-8.00 micrometers; 8.00-10.08 micrometers; 10.08-12.70

micrometers; 12.70-16.00 micrometers; 16.00-20.20 micrometers; 20.20-25.40 micrometers; 25.40-32.00 micrometers; 32.00-40.30 micrometers channels are used.

[0107] Weighing capacity of the measuring method samples 2-10g of the acid number is carried out to a 200-300ml Erlenmeyer flask, about 50ml of mixed solvents of methanol:toluene=30:70 is added, and a resin is dissolved. As long as it seems that solubility is bad, you may add a small amount of acetone. It titrates with N / 10 caustic potash by which standardization was beforehand carried out to 0.1% of bromthymol blue using the mixed indicator of a Phenol Red - an alcoholic solution, and the acid number is calculated by the next calculation from the consumption of alcoholic-potash liquid.

[0108]

Acid number =  $\text{KOH(ml number)} \times N \times 56.1 / \text{sample weight (however, } N \text{ N/10 factor of KOH)}$

[0109] Measuring method drawing 2 of the amount of triboelectrification of a toner is explanatory drawing of the equipment which measures the amount of triboelectrification. About 0.5-1.5g of binary system developers extracted from the development sleeve of a copying machine or a printer is put into the metal measurement container 52 which has the screen 53 of 500 meshes in a bottom, and it is covered with the metal free wheel plate 54. The weight of the measurement container 52 whole at this time is made into \*\*\*\* W1 (g). Next, in the suction machine 51 (the portion which touches the measurement container 52 is an insulator at least), it draws in from the suction mouth 57, the air-capacity control valve 56 is adjusted, and the pressure of a vacuum gage 55 is set to 250mmAq(s). In this state, suction is performed for 2 minutes sufficiently preferably, and suction removal of the toner is carried out. Potential of the electrometer 59 at this time is set to V (volt). 58 is a capacitor and sets capacity to C (mF) here. Moreover, the weight of the whole measurement container after suction is made into \*\*\*\* W2 (g). The amount of triboelectrification of this sample (mC/kg) is computed like a lower formula.

[0110] Amount of triboelectrification (mC/kg) =  $C \times V / \text{of a sample (W1-W2)}$

(However, measurement conditions are set to 23 degrees C and 60%RH.)

[0111] The coat ferrite carrier which the carrier particle of 250-mesh path 350-mesh-on has 70 to 90% of the weight is used for the carrier used for measurement.

[0112] The diameter of a measuring method primary particle of the mean particle diameter of a titanium oxide particle and an alumina particle Observe a titanium oxide particle and an alumina particle with a transmission electron microscope, measure 300 particle diameters 0.005 micrometers or more expanded by 30,000 in a visual field, or 50,000 times, and it asks for a mean particle diameter. The diameter of a particulate material on a toner particle carries out the quality of 300 titanium oxide particles and alumina particle which observed with the scanning electron microscope and were expanded by 30,000 in a visual field, or 50,000 times by XMA, measures the particle diameter, and asks for a mean particle diameter.

[0113]

[Example] Based on an example, this invention is explained more to a detail.

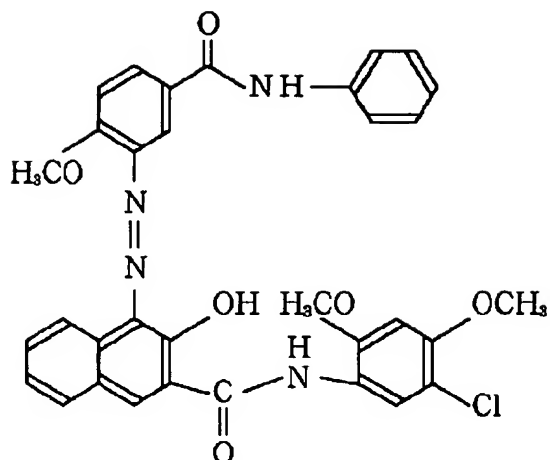
[0114]

<Example 1> - polyester resin No.1 The 100 weight sections (condensation polymer of propoxy-ized bisphenol A and boletic acid, acid-number:10.8 mgKOH/g)

- Negative electric charge nature control agent 4 weight sections (aluminum compound of a G tertiarybutyl salicylic acid)

- The following compound (III) 5 weight sections [0115]

[Formula 10]



(III)

[0116] The Henschel mixer performed preliminary mixture enough, melting kneading of the above-mentioned material was carried out with the tandem-drum-arrangement extruder, coarse grinding was carried out about 1-2mm using the hammer mill after cooling, and, subsequently it pulverized with the pulverizer by the air-jet method. Furthermore, fines and the coarse powder were simultaneously removed for the obtained pulverizing object strictly by the hyperfractionation classifier, and the Magenta color toner particle of 8.0 micrometers of weight mean diameters was obtained.

[0117] On the other hand, surface treatment was carried out using 20 weight sections of n-C<sub>4</sub>H<sub>9</sub>-Si (OCH<sub>3</sub>)<sub>3</sub> to the hydrophilic titanium oxide pulverized-coal (0.02 micrometer [ of primary mean particle diameters ], BET specific surface area 140m<sup>2</sup>/g) 100 weight section as a flow improver and an electrification stabilizing agent, and the hydrophobic titanium oxide pulverized coal A of 0.02 micrometers of primary mean particle diameters and the 70% of the degrees of hydrophobing was obtained.

[0118] The Magenta color toner particle 100 weight section and the hydrophobic titanium oxide pulverized-coal A 1.5 weight section were mixed, and the Magenta toner 1 which has a hydrophobic titanium oxide particle on a Magenta color toner particle front face was prepared.

[0119] It mixed so that toner concentration might become 5% of the weight, and the magnetic ferrite carrier particle (30 micrometers of mean particle diameters) which carried out surface coating to the above-mentioned Magenta toner 1 by silicone resin was made into the binary system Magenta developer.

[0120] Although it introduced into the regular paper full color copying machine (the color laser copying machine CLC700, Canon make) of marketing of the above-mentioned binary system Magenta developer and the copy examination was performed, also in the durability test of 50,000 sheets, picture concentration indicates high picture concentration to be 1.7-1.8 under ordinary temperature normal-relative-humidity environment (23 degrees C, 60%), and it also sets in an electrification property, and there is also little initial change and it is. -It changed stably between 22 mC/kg - -25 mC/kg

[0121] Filming by toner weld was not seen, either and the photoconductor drum front face after 50,000-sheet durability was not generated poor cleaning and once in the meantime.

[0122] A 50,000-sheet durable copy did not produce the offset to a fixing roller at all, either. Although the fixing roller front face after durability was observed by viewing, there was no contamination by the toner.

[0123] When the carrier front face in the developer after 50,000-sheet durability was observed in SEM, most toner SUPENTO was not seen.

[0124] Furthermore, although the durability test of 50,000 sheets was performed under a high-humidity/temperature environment (30 degrees C, 80%) and low-humidity/temperature environment (15 degrees C, 10%), fogging, scattering, etc. were not generated but picture concentration also changed to stability mostly.

[0125] As the evaluation method of a color copy picture; there is a method of judging the quality of a

color picture by measuring the gloss on the front face of a picture (glossiness). that is, there needs to be a picture front face on which it was judged as color quality with so smooth that a gloss value is high a picture front face and glossy high saturation in, and the gloss value was conversely somber with the low and where saturation is scarce -- \*\*'s -- \*\* -- it is judged In the example 1, the gloss of contrast potential 300V was 21%.

[0126] The VG-10 type glossmeter made from Japanese \*\*\*\* Co. was used for measurement of a gloss (glossiness). In measurement, it set to 6V by the voltage stabilizer first, subsequently to 60 degrees, the floodlighting angle and the light-receiving angle were doubled, respectively, and the aforementioned sample picture was placed on the sample base after standards setting using zero-point adjustment and the standard board, and white paper was further piled up on three sheets, it measured, and the numeric value shown in an indicator was read per %.

[0127] The target thing [ chromaticity / of the acquired picture ] was obtained. Namely,  $a^*=75.2$   $b^*=-2.3$  It was  $L^*=46.3$ .

[0128] The color tone of a toner was quantitatively measured in Commission Internationale de l'Eclairage (CIE) in 1976 based on the definition of a color coordinate system by which specification was carried out. At that time, it fixed to 1.70 and picture concentration measured  $a^*$ ,  $b^*$  (chromaticity  $a^*$  and  $b^*$  indicate a hue and saturation to be), and  $L^*$  (lightness). Using the spectral-colorimetry meter type 938 made from X-Rite in a measuring instrument, the light source for observation was made into illuminant C, and the angle of visibility was made into 2 degrees.

[0129] The transparency of the OHP picture which projected the color picture furthermore formed in the transparency film on the over head projector (OHP) was also good.

[0130] About the transparency of the OHP picture in the above-mentioned example, the color picture formed in the transparency film was projected using the commercial over head projector, and it evaluated based on the following error criteria.

[0131]

(Error criterion)

O : excel in transparency, and there is also no light-and-darkness nonuniformity and color-reproduction nature is also excellent. (Good)

\*\* : Although there is light-and-darkness nonuniformity a little, it is satisfactory practically. (good)

x : There is light-and-darkness nonuniformity and it is lacking in color-reproduction nature. (improper)

[0132] Moreover, it is JIS about the lightfastness of the acquired solid picture (picture concentration 1.70). When checked almost according to K7102, the picture after optical 400-hour irradiation also showed the almost same picture concentration (1.68) as the first stage, and most hue change was not seen ( $\Delta E=2.8$ ). In addition, the carbon arc lamp was used for the light source.

[0133] Hue change was quantitatively evaluated in quest of  $\Delta E$  value of the following formula.

[0134]

[Equation 2]

$$\Delta E = \left\{ (L_1^* - L_2^*)^2 + (a_1^* - a_2^*)^2 + (b_1^* - b_2^*)^2 \right\}^{1/2}$$

$L_1^*$  光照射前の画像の明度

$a_1^*$ ,  $b_1^*$  光照射前の画像の色相と彩度を示す色度

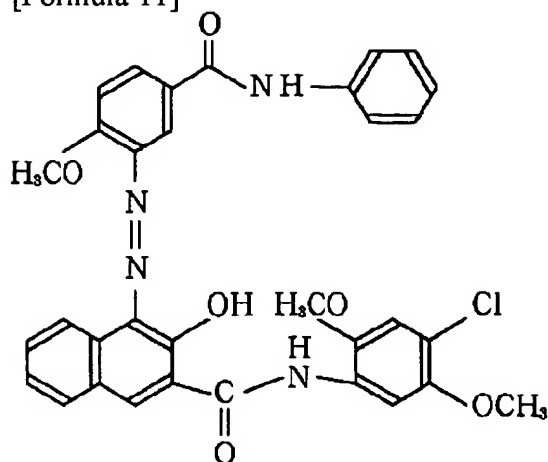
$L_2^*$  光照射後の画像の明度

$a_2^*$ ,  $b_2^*$  光照射後の画像の色相と彩度を示す色度

[0135] It replaces with the compound (III) used in the <example 2> example 1, and is the following formula (IV).

[0136]

[Formula 11]



(IV)

If it removed coming out and using the compound (IV) shown, the Magenta toner 2 was prepared like the example 1.

[0137] When evaluated like the example 1, the bottom of a high-humidity/temperature environment and low-humidity/temperature environment showed good picture stability and electrification stability.

Moreover,  $a^*=73$   $b^*=0$  It was  $L^*=46.0$ , and although shifted to redness a little, the picture of a target color tone was acquired.

[0138] It replaces with the compound (III) used in the <example 1 of comparison> example 1, and is C.I. Pigment. Red If it removed using 57:1, the Magenta toner 3 was prepared like the example 1.

[0139] When it evaluates like an example 1, the amount of initial electrifications under a high-humidity/temperature environment is low, and this has guessed for addition of the water to calcium ion contained in the used pigment.

[0140] Moreover,  $a^*=74$   $b^*=2$  It was  $L^*=45.0$ , and compared with the example 1, redness was strong and lightfastness was also inferior in it.

[0141] It replaced with polyester resin No.1 used in the <example 3> example 1, and if it removed using polyester resin No.2 (condensation polymer of propoxy-ized bisphenol A and boletic acid, acid-number:4.0 mgKOH/g), the Magenta toner 4 was obtained like the example 1. Although picture concentration began to fall from per 20000th sheet by the durability under low-humidity/temperature environment when evaluated like the example 1, it was in practical use level.

[0142] It replaced with polyester resin No.1 used in the <example 4> example 1, and if it removed using polyester resin No.3 (condensation polymer of propoxy-ized bisphenol A and boletic acid, acid-number:20.2 mgKOH/g), the Magenta toner 5 was obtained like the example 1. Although the amount of electrifications fell a little under the high-humidity/temperature environment when evaluated like the example 1, the picture top problem was not generated.

[0143] It replaced with polyester resin No.1 used in the <example 2 of comparison> example 1, and if it removed using polyester resin No.4 of acid-number 1.8 mgKOH/g, the Magenta toner 6 was obtained like the example 1. Although it was satisfactory especially under ordinary temperature normal-relative-humidity environment when evaluated like the example 1, in the durability under low-humidity/temperature environment, picture concentration falls from per 10000th sheet, and fogging began to occur a little.

[0144] It replaced with polyester resin No.1 used in the <example 3 of comparison> example 1, and if it removed using polyester resin No.5 of acid-number 28 mgKOH/g, the Magenta toner 7 was obtained like the example 1. Although early picture concentration was high and it was good also in several multi-sheet durability under ordinary temperature normal-relative-humidity environment when evaluated like the example 1, under the high-humidity/temperature environment, the amount of electrifications of a Magenta toner falls gradually, picture concentration rises in connection with it, and scattering and fogging began to occur a little.

[0145] It replaced with polyester resin No.1 used in the <example 4 of comparison> example 1, and if it removed using styrene-n-butyl acrylate copolymer No.6 (30,000 Mw : Mn: 9000, acid-number:0 mgKOH/g) as a binding resin, the Magenta toner 8 was prepared like the example 1. Although the good result was obtained under each environment when evaluated like the example 1, as compared with the Magenta toner of an example 1, it was inferior to color mixture nature with a yellow toner and a cyano toner. That is, the high red and the blue picture of saturation and lightness were not acquired.

[0146] It replaces with the compound (III) used in the <example 5 of comparison> example 1, and is C.I.Pigment. Red If it removed using 5, the Magenta toner 9 was prepared like the example 1. When it evaluates like an example 1, the pigment-content powder in polyester resin serves as a picture which lacks in the cause [ being bad ] and OHP transparency.

[0147] It replaces with the compound (III) used in the <example 6 of comparison> example 1, and is C.I.Pigment. Red If it removed using 170, the Magenta toner 10 was prepared like the example 1. When evaluated like the example 1, the amount of electrifications under high-humidity/temperature falls, picture concentration rises in connection with it, and scattering and fogging began to arise. Moreover,  $a^*=73$   $b^*=2$  It is  $L^*=44.0$  and had shifted to color tone mist or redness as compared with the example 1.

[0148] It replaces with the hydrophobic titanium oxide pulverized coal A used in the <example 5> example 1. the alumina pulverized coal (primary mean-particle-diameter: -- 0.02 micrometers) of a hydrophilic property BET specific surface area : if it removes having used the hydrophobic alumina pulverized coal B of 0.02 micrometers of diameters of a primary particle, and the 70% of the degrees of hydrophobing which carried out 17 weight sections use and carried out surface treatment of iso-C<sub>4</sub>H<sub>9</sub>-Si (OCH<sub>3</sub>)<sub>3</sub> to the 130m<sup>2</sup>/g100 weight section The Magenta toner 11 was prepared like the example 1, and it evaluated like the example 1.

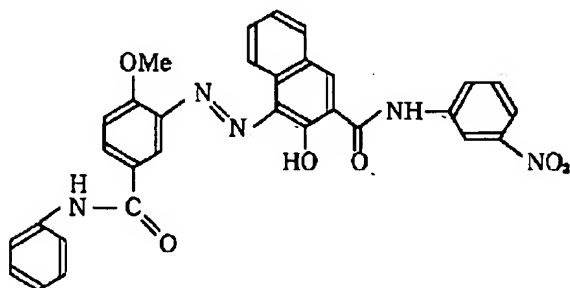
[0149] Good endurance was shown under each environment and lightfastness and the hue showed the almost same inclination as an example 1.

[0150] It replaces with the hydrophobic titanium oxide pulverized coal A used in the <example 7 of comparison> example 1. If it removes having used the hydrophobic silica pulverized coal C of 0.007 micrometers of diameters of a primary particle, and the 65% of the degrees of hydrophobing which carried out 20 weight sections use and carried out surface treatment of the hexamethyldisilazane to the silica (primary mean particle diameter : 0.007-micrometer, BET specific surface area:380m<sup>2</sup>/g) 100 weight section of a hydrophilic property The Magenta toner 12 was prepared like the example 1, and it evaluated like the example 1. The amount of electrifications of a toner began to rise from the hit which passed over the 2000th sheet in the durability under low-humidity/temperature environment, picture concentration fell, and durability was interrupted for the 5000th sheet. moreover, in the durability under a high-humidity/temperature environment, since it was alike gradually, the amount of electrifications of a toner begins to have fallen and toner scattering and fogging began to have been conspicuous, similarly durability was interrupted for the 5000th sheet

[0151] It replaces with the compound (III) used in the <example 6> example 1, and is C.I.Pigment of the following structure. Red If it removed using 31, the Magenta toner 13 was prepared like the example 1. It is  $a^*=74$  when evaluated like the example 1.  $b^*=-5.0$  It was  $L^*=45.0$ , and although shifted a little to blueness compared with the example 1, the toner of practical use level was obtained.

[0152]

[Formula 12]  
C.I.Pig.Red 31

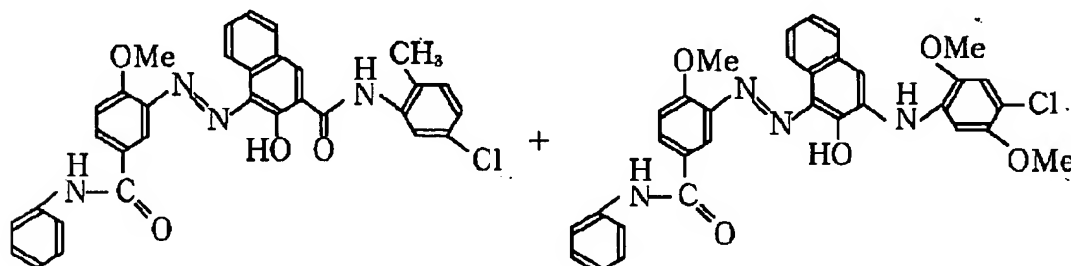


[0153] It replaces with the compound (III) used in the <example 7> example 1, and is C.I.Pigment of the following structure. Red If it removed using 184, the Magenta toner 14 was prepared like the example 1. It is  $a^*=74b^*=-0.9$  when evaluated like the example 1. It was  $L^*=46.0$ , and although shifted a little to redness compared with the example 1, the toner of practical use level was obtained.

[0154]

[Formula 13]

C.I.Pig.Red 184



[0155] If it removed having extracted the negative electrification nature control agent used in the <example 8> example 1, the Magenta toner 14 was prepared like the example 1. When evaluated like the example 1, compared with the example 1, electrification stability was a little missing, and although concentration change was large, the toner of practical use level was obtained.

[0156] Table 1 and an evaluation result are shown for the toner composition of each example and the example of comparison in Table 2.

[0157]

[Table 1]

	粘着樹脂		着色剤		負荷電 制御剤	外添剤		粒子の 重量平均径
	種類	酸価 (mgKOH/g)	種類	量		種類	量	
実施例 1	ポリエステル樹脂	No.1 10.8	化合物 (Ⅲ)	5重量部	4重量部	疎水性酸化チタン微粉体 A	1.5重量部	8.0 μm
実施例 2	ポリエステル樹脂	No.1 10.8	化合物 (Ⅳ)	5重量部	4重量部	疎水性酸化チタン微粉体 A	1.5重量部	8.0 μm
比較例 1	ポリエステル樹脂	No.1 10.8	C.I.Pig.Red 57 : 1	5重量部	4重量部	疎水性酸化チタン微粉体 A	1.5重量部	8.0 μm
実施例 3	ポリエステル樹脂	No.2 4.0	化合物 (Ⅲ)	5重量部	4重量部	疎水性酸化チタン微粉体 A	1.5重量部	8.0 μm
実施例 4	ポリエステル樹脂	No.3 20.2	化合物 (Ⅲ)	5重量部	4重量部	疎水性酸化チタン微粉体 A	1.5重量部	8.0 μm
比較例 2	ポリエステル樹脂	No.4 1.8	化合物 (Ⅲ)	5重量部	4重量部	疎水性酸化チタン微粉体 A	1.5重量部	8.0 μm
比較例 3	ポリエステル樹脂	No.5 28.0	化合物 (Ⅲ)	5重量部	4重量部	疎水性酸化チタン微粉体 A	1.5重量部	8.0 μm
比較例 4	スチレン-アクリル系樹脂	No.6 0	化合物 (Ⅲ)	5重量部	4重量部	疎水性酸化チタン微粉体 A	1.5重量部	8.0 μm
比較例 5	ポリエステル樹脂	No.1 10.8	C.I.Pig.Red 5	5重量部	4重量部	疎水性酸化チタン微粉体 A	1.5重量部	8.0 μm
比較例 6	ポリエステル樹脂	No.1 10.8	C.I.Pig.Red 170	5重量部	4重量部	疎水性酸化チタン微粉体 A	1.5重量部	8.0 μm
実施例 5	ポリエステル樹脂	No.1 10.8	化合物 (Ⅲ)	5重量部	4重量部	疎水性アルミナ微粉体 B	1.5重量部	8.0 μm
比較例 7	ポリエステル樹脂	No.1 10.8	化合物 (Ⅲ)	5重量部	4重量部	疎水性シリカ微粉体 C	1.5重量部	8.0 μm
実施例 6	ポリエステル樹脂	No.1 10.8	C.I.Pig.Red 31	5重量部	4重量部	疎水性酸化チタン微粉体 A	1.5重量部	8.0 μm
実施例 7	ポリエステル樹脂	No.1 10.8	C.I.Pig.Red 184	5重量部	4重量部	疎水性酸化チタン微粉体 A	1.5重量部	8.0 μm
実施例 8	ポリエステル樹脂	No.1 10.8	化合物 (Ⅲ)	5重量部	—	疎水性酸化チタン微粉体 A	1.5重量部	8.0 μm

[0158]

[Table 2]

	高温高湿環境下				低温低湿環境下		耐光性	OHP 透明性	色再現性
	摩擦帯電量 (mC/kg)	画像濃度	カブリ	トナー 飛散	摩擦帯電量 (mC/kg)	画像濃度			
実施例1	-20~-22	1.6~1.8	◎	◎	-25~-28	1.6~1.8	優	○	◎
実施例2	-20~-22	1.6~1.8	◎	◎	-25~-28	1.6~1.8	優	○	○
比較例1	-17~-21	1.6~1.9	×	△	-24~-27	1.5~1.8	悪い	○	×
実施例3	-20~-22	1.6~1.8	◎	◎	-25~-30	1.5~1.8	優	○	◎
実施例4	-18~-22	1.6~1.9	○	○	-25~-27	1.6~1.8	優	○	◎
比較例2	-23~-25	1.5~1.7	△	○	-27~-33	1.4~1.6	優	△	◎
比較例3	-18~-23	1.6~1.9	×	△	-29~-31	1.5~1.7	優	○	◎
比較例4	-20~-24	1.4~1.6	○	○	-27~-34	1.4~1.6	良	×	△
比較例5	-20~-23	1.5~1.7	○	○	-25~-28	1.6~1.8	良	△	○
比較例6	-18~-21	1.6~1.9	×	△	-25~-27	1.5~1.7	悪い	×	△
実施例5	-20~-22	1.6~1.8	◎	◎	-24~-28	1.6~1.8	優	○	◎
比較例7	*-15~-22	*1.5~1.9	*×	*×	*-24~-36	*1.3~1.8	*普通	○	◎
実施例6	-20~-23	1.6~1.8	○	○	-26~-29	1.5~1.8	優	○	○
実施例7	-20~-22	1.5~1.8	○	○	-25~-28	1.6~1.8	優	○	○
実施例8	-18~-22	1.6~1.9	○	○	-24~-28	1.6~1.8	優	○	◎

- (1) カブリ：非画像部の状態を目視で判断  
 ◎…優  
 ○…良  
 △…普通  
 ×…悪い
- (2) トナー飛散：複写機内の状態を目視で判断  
 ◎…優  
 ○…良  
 △…普通  
 ×…悪い
- (3) 耐光性：  
 優：200時間照射後でも退色しない  
 良：100時間照射後でも退色しない  
 悪い：60時間照射で退色
- (4) 色再現性…画像部を目視で判断  
 ◎…優  
 ○…良  
 △…普通  
 ×…悪い
- \*：耐久枚数 5000枚

[0159]

[Effect of the Invention] Specific polyester resin is used for the Magenta toner of this invention as a binding resin. To the Magenta color toner particle containing the compound (I) which is a beta-naphthol derivative as a Magenta coloring agent From the specific titanium oxide pulverized coal or specific alumina pulverized coal of the first [ an average of ] particle size by which hydrophobing processing was carried out being \*\* (ed) outside A good hue is shown, have the outstanding color-reproduction nature, and the fall of the amount of triboelectrification of the toner under a high-humidity/temperature environment is suppressed. And it is possible to form the picture excellent in the lightfastness of the Magenta picture to which the fault size of the amount of triboelectrification under low-humidity/temperature environment is suppressed, and it excels in environmental stability, and was fixed.

[Translation done.]